

REMARKS

Applicants respectfully request further examination and reconsideration in view of the above amendments and the comments set forth fully below. Claims 1-69 were pending. Within the Office Action, Claims 1-69 have been rejected. By the above amendment, Claims 1, 15, 29, 43, 44 and 57 have been amended. Accordingly, Claims 1-69 are now pending.

Rejections Under 35 U.S.C. § 103

Within the Office Action, Claims 1-69 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,314,071 to Christian et al. (hereinafter referred to as “Christian”). Christian teaches a glass sorter including an opaque sorter 16, a green sorter 17 and a brown sorter 18. [Christian, col. 1, lines 46-49, Figures 1 and 2] Christian teaches that the opaque sorter 16 comprises a first conveyor 21, the green sorter 17 comprises a second conveyor 27 and the brown sorter 18 comprises a third conveyor 33. [Christian, col. 1, line 50 - col. 2, line 4, Figure 2] The first conveyor 21 directs glass between the first lamp array 22 and the first sensor array 23 and the first ejector array 24 ejects opaque materials from the path of flow. [Christian, col. 3, lines 2-10, Figure 2] Material not ejected by the first ejector array 24 falls on the second conveyor 27. [Christian, col. 3, lines 10-14, Figure 2] The second conveyor 27 directs glass between the second lamp array 28 and the second sensor array 29 and the second ejector array 30 deflects green glass from the path of flow. [Christian, col. 3, lines 10-17, Figure 2] Material not ejected by the second ejector array 30 falls on the third conveyor 33. [Christian, col. 3, lines 14-21, Figure 2] The third conveyor 33 directs glass between the third lamp array 34 and the third sensor array 35 and the third ejector array deflects brown glass out of the flow while the remaining clear glass falls into a clear glass area. [Christian, col. 3, lines 21-25, Figure 2] In an alternate embodiment, Christian also teaches another configuration of sorters where part of the output of a first sorter becomes the input of two subsequent sorters. [Christian, col. 7, lines 37-47, Figure 11] In a further alternate embodiment, Christian teaches a sorter with actuators that sort cullet into three bins. [Christian, col. 7, line 55 - col. 8, line 8, Figure 12] Within Christian, the embodiments of Figures 2, 11 and 12 are *alternates* of each other for achieving the result of sorting the cullet. There would be no motivation to combine the *alternate* embodiments taught within Christian. Further, there is no hint, teaching or suggestion within Christian that these *alternate* embodiments should or could be combined. Also, Christian does not teach simultaneously sorting the cullets with the plurality of sorters.

In contrast to the teachings of Christian, the method and apparatus for multi-stage sorting of glass cullets of the present invention includes a plurality of sorting devices which simultaneously sort different colored objects based on their light transmission properties into more than two output feeds, wherein at least one output feed is a subsequent input feed to one or more sorting devices in the plurality. The one or more sorting devices sort the at least one subsequent input feed into a plurality of further sorted output feeds. At least one of the plurality of sorting devices is a final sorting device, wherein the final sorting device sorts one or more subsequent input feeds into a plurality of final output feeds. Figure 3 of the Present Invention and the accompanying text on page 11, lines 15-24 describe the sorting devices operating simultaneously. As described above, there is no hint, teaching or suggestion within Christian to combine the *alternate* embodiments of Figures 2, 11 and 12. As further described above, Christian does not teach simultaneously sorting the cullets with the plurality of sorters. Simultaneously sorting objects at multiple stages, as taught and claimed in the present application, has the advantages of increasing throughput while maintaining the quality of the sorted objects.

Claim 1 is directed to a system for sorting a mixed stream of different colored objects into separate groups of same colored objects. The system of Claim 1 comprises a plurality of sorting devices each for receiving an input feed of different colored objects and sorting the different colored objects into a plurality of output feeds, wherein the plurality of sorting devices operate simultaneously, wherein at least one output feed in the plurality of output feeds is a subsequent input feed to one or more sorting devices in the plurality of sorting devices and further wherein at least one of the plurality of sorting devices sorts the different colored objects into more than two output feeds. As described above, there is no hint, teaching or suggestion within Christian to combine the *alternate* embodiments of Figures 2, 11 and 12. As also discussed above, Christian does not teach a plurality of sorting devices each for receiving an input feed of different colored objects and sorting the different colored objects into a plurality of output feeds, wherein the plurality of sorting devices operate simultaneously. For at least these reasons, the independent Claim 1 is allowable over the teachings of Christian.

Claims 2-14 are dependent on the independent Claim 1. As discussed above, the independent Claim 1 is allowable over the teachings of Christian. Accordingly, Claims 2-14 are all also allowable as being dependent on an allowable base claim.

The independent Claim 15 is directed to a method of effectively sorting a group of different colored objects into separate groups of similar colored objects. The method of Claim 15 comprises receiving an input feed having a plurality of objects and sorting the input feed into

more than two output feeds, wherein at least one output feed in the output feeds serves as a subsequent input feed, wherein sorting occurs simultaneously for the input feeds. As described above, there is no hint, teaching or suggestion within Christian to combine the *alternate* embodiments of Figures 2, 11 and 12. As also described above, Christian does not disclose, teach, or even suggest sorting the input feed into more than two output feeds, wherein at least one output feed in the output feeds serves as a subsequent input feed, wherein sorting occurs simultaneously for the input feeds. For at least these reasons, the independent Claim 15 is allowable over the teachings of Christian.

Claims 16-28 are dependent on the independent Claim 15. As discussed above, the independent Claim 15 is allowable over the teachings of Christian. Accordingly, Claims 16-28 are all also allowable as being dependent on an allowable base claim.

The independent Claim 29 is directed to a method of effectively sorting different colored objects into a plurality of groups of objects having a similar desired quality. The method of Claim 29 comprises providing a plurality of sorting devices, wherein each sorting device receives a mixture of objects of different qualities and separates the different received objects into two or more output feeds, each output feed having objects of a substantially similar quality, wherein the plurality of sorting devices operate simultaneously, further wherein at least one of the plurality of sorting devices sorts the different colored objects into more than two output feeds and configuring the plurality of sorting devices such that at least one output feed in each of one or more sorting devices in the plurality is input into a corresponding subsequent sorting device. As described above, there is no hint, teaching or suggestion within Christian to combine the *alternate* embodiments of Figures 2, 11 and 12. As also described above, Christian does not disclose, teach, or even suggest providing a plurality of sorting devices, wherein each sorting device receives a mixture of objects of different qualities and separates the different received objects into two or more output feeds, each output feed having objects of a substantially similar quality, wherein the plurality of sorting devices operate simultaneously. For at least these reasons, the independent Claim 29 is allowable over the teachings of Christian.

Claims 30-42 are dependent on the independent Claim 29. As discussed above, the independent Claim 29 is allowable over the teachings of Christian. Accordingly, Claims 30-42 are all also allowable as being dependent on an allowable base claim.

The independent Claim 43 is directed to a multi-level sorting system for separating different colored cullets into cullets having substantially similar color characteristics. The system of Claim 43 comprises a first means for sorting the cullets, wherein the first means for sorting directs the sorted cullets into more than two first output paths, a second means for further

sorting at least one received first output path, wherein the second means for sorting directs the further sorted cullets into more than two second output paths, and a third means for subsequently sorting at least one received first output path and at least one received second output path, wherein the third means for sorting directs the subsequently sorted cullets into more than two output paths, wherein the first means, the second means and the third means for sorting sort cullets simultaneously. As described above, there is no hint, teaching or suggestion within Christian to combine the *alternate* embodiments of Figures 2, 11 and 12. As also described above, Christian does not teach the first means, the second means and the third means for sorting sort the cullets simultaneously. For at least these reasons, the independent Claim 43 is allowable over the teachings of Christian.

The independent Claim 44 recites a multi-level sorting system for separating a mixed stream of colored cullets into cullets having substantially similar color characteristics. The multi-level sorting system of claim 44 comprises a first stage tri-sorter for sorting the cullets, wherein the first stage tri-sorter directs the sorted cullets into a plurality of first stage output paths, a second stage tri-sorter coupled to the first stage tri-sorter, the second stage tri-sorter for sorting cullets in at least one received first stage output path, thereby forming a second set of sorted cullets, wherein the second stage tri-sorter directs the second set of sorted cullets into a plurality of second stage output paths, a third stage tri-sorter coupled to the first and second stage tri-sorters, the third stage tri-sorter for sorting cullets in at least one received first stage output path and at least one received second stage output path, thereby forming a third set of sorted cullets, wherein the third stage tri-sorter directs the third set of sorted cullets into a plurality of third stage output paths, wherein at least one of the first, second, and third stage tri-sorters has more than two output paths, wherein the first stage tri-sorter, the second stage tri-sorter and the third stage tri-sorter sort cullets simultaneously. As described above, there is no hint, teaching or suggestion within Christian to combine the *alternate* embodiments of Figures 2, 11 and 12. As also described above, Christian does not disclose, teach, or even suggest the first stage tri-sorter, the second stage tri-sorter and the third stage tri-sorter sort the cullets simultaneously. For at least these reasons, the independent Claim 44 is allowable over the teachings of Christian.

Claims 45-56 are dependent on the independent Claim 44. As discussed above, the independent Claim 44 is allowable over the teachings of Christian. Accordingly, Claims 45-56 are all also allowable as being dependent on an allowable base claim.

The independent Claim 57 is directed to a multi-level sorting system for separating a mixed stream of colored cullets into cullets having substantially similar color characteristics. The multi-level sorting system of Claim 57 comprises a plurality of first stage tri-sorters for

sorting the cullets, wherein the plurality of first stage tri-sorters direct the sorted cullets into a plurality of first output paths, a second stage tri-sorter coupled to the plurality of first stage tri-sorters, the second stage tri-sorter for sorting cullets in at least one received first output path from each first stage tri-sorter, thereby forming second sorted cullets, wherein the second stage tri-sorter directs the second sorted cullets into a plurality of second output paths, and a third stage tri-sorter coupled to the plurality of first stage tri-sorters and the second stage tri-sorter, the third stage tri-sorter for sorting cullets in at least one received first output path from each of the plurality of first stage tri-sorters and at least one received second output path, thereby forming third sorted cullets, wherein the third stage tri-sorter directs the third sorted cullets into a plurality of third output paths, wherein the plurality of first stage tri-sorters, the second stage tri-sorter and the third stage tri-sorter sort simultaneously. As described above, there is no hint, teaching or suggestion within Christian to combine the *alternate* embodiments of Figures 2, 11 and 12. As also described above, Christian does not teach the plurality of first stage tri-sorters, the second stage tri-sorter and the third stage tri-sorter sort simultaneously. For at least these reasons, the independent Claim 57 is allowable over the teachings of Christian.

Claims 58-69 are dependent on the independent Claim 57. As discussed above, the independent Claim 57 is allowable over the teachings of Christian. Accordingly, Claims 58-69 are all also allowable as being dependent on an allowable base claim.

In view of the foregoing, Claims 1-69, are in condition for allowance. Examination is respectfully requested and allowance is earnestly solicited at the earliest possible date. The Examiner is encouraged to call the undersigned at (408) 530-9700 to discuss with questions or concerns so that any outstanding issues can be expeditiously resolved.

Respectfully submitted,
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CERTIFICATE OF MAILING (37 CFR § 1.8(a))

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